Amendments to the Claims

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (original) A method for encoding an error correcting code for providing an error correcting code to a client signal having a fixed bit rate, said method comprising the steps of:

repeatedly parallelizing said client signal to B systems every A bits to generate B parallelized client signals;

segmenting said B parallelized client signals every C bits to create B parallelized client blocks;

increasing a bit rate of each of said B parallelized client blocks by a factor of D to increase a length of each said parallelized client block from C bits to E bits to create B outer code subblocks;

placing information of said parallelized client blocks in second bit to a (C+1)th bit in each of said B outer code subblocks or a time series basis, leaving a first bit and a (C+2)th bit to an E-th bit as an empty area created by increasing the bit rate, assigning a first bit of said empty area as an overhead area, and an area from a (C+2)th bit to the E-th bit of said empty area as a check bit are for an outer code; and

encoding each of said B outer code subblocks independently with an outer code Λ, and placing check bits thereof in said check bit area for the outer code to create B outer encoded

subblocks.

2. (original) A method for encoding an error correcting code according to claim 1, further comprising the steps of:

adding F empty blocks to said B outer encoded subblocks, said empty block having the same length as said outer encoded subblock, to create a total of G intermediate subblocks;

assigning an area of said F empty blocks as a check bit area for an inner code;

segmenting each of said G intermediate subblocks every H bits, and collecting an amount of the segmented H bits corresponding to said G intermediate subblocks to create one inner code subblock;

segmenting again said G intermediate sub-blocks into J of said inner code subblocks;

encoding each of said J inner code subblocks independently with an inner code Ψ, placing check bits thereof in said check bit area for the inner code to create J inner encoded subblocks;

inserting a framing pattern indicative of starting positions of said outer encoded subblocks and said inner *coded* subblocks, and a plurality of information for OAM&P of a network into said overhead area;

regarding said J inner subblocks as a single inner encoded block,

performing predetermined scrambling on said inner encoded block to create a scrambled inner coded block; and

interleaving every L consecutive bits from each of G parallel signals in said scrambled inner encoded block to generate a single serial super FEC signal having a bit rate (D X G/B)

times as high as that of said client signal,

wherein said A, B, C, E, F, G, H, J, L are predetermined integer values, and said D is a predetermined value.

3. (original) A method or encoding an error coding code according to claim 1, further comprising the steps of:

increasing a bit rate of each of said B outer encoded subblocks by a factor of R to create B intermediate subblocks;

allocating an empty area comprised of Q consecutive bits created by increasing the bit rate in every P consecutive bits of an inner code information area in each of said B intermediate subblocks, placing information of said outer encoded subblocks in said inner code information area, and assigning said Q bits of the empty area as a check bit area for an inner code;

segmenting each of said B intermediate subblocks every (P+Q) bits corresponding to said inner code information area and said check bit area for the inner code, collecting a number of segmented (P+Q) bits corresponding to said B intermediate subblocks to create a single inner code subblock;

segmenting again said B intermediate subblocks into J of said inner cede subblocks;

encoding each of said J inner code subblocks independently with an inner code Ψ, placing check bits thereof in said check bit area for the inner code to create J inner encoded subblocks;

inserting a framing pattern indicative of starting positions of said outer coded subblocks and said inner coded subblocks, and a plurality of information for OAM& P of a network into

said overhead area;

regarding said J inner encoded subblock as a single inner encoded block;

performing predetermined scrambling on said inner encoded block to create a scrambled inner coded block; and

interleaving every L consecutive bits from each of G parallel signals in said scrambled inner encoded block to generate a single serial super FEC signal having a bit rate (D X R) times as high as that of said client signal,

wherein said A, B, C, E, J, L, P, Q are predetermined integer values and said D and R are predetermined values.

4-6. (withdrawn)

7. (original) A method for encoding an error correcting code according to claim 1, wherein:

said A is set to 1; said B is set to 128; said C is set to 238; said D is set to 15/14; said E is set to 255; sand F is set to 16; said G is set to 144; said H is set to 1; said J is set to 255; and said L is set to 1;

said outer code Λ comprises either an eight-error-correcting Reed-Solomon code on Galois field, or an eleven-error-correcting shortened BCH code based on Galois field; and

said inner code Ψ comprises either a single-error-correcting shortened Reed-Solomon code on Galois field, or a double-error-correcting shortened BCH code based on Galois field.

8. (withdrawn)

9. (original) A method for encoding an error correcting code according to claim 1, wherein:

said A is set to 1; said B is set to 112; said C is set to 238; said D is set to 15/14; said E is set to 255; said F is set to 16; said G is set to 128; said H is set to 1; said J is set to 255; and said L is set to 1;

said outer code Λ comprises either an eight-error-correcting Reed-Solomon code on Galois field, or an eleven-error-correcting shortened BCH code based on Galois field; and

said inner code Ψ comprises either a single-error-correcting shortened Reed-Solomon code on Galois field, or a double-error-correcting shortened BCH code based on Galois field.

10. (withdrawn)

11. (original) A method for encoding an error correcting code according to claim 3, wherein:

said A is set to 1; said B is set to 128; said C is set to 238; said D is set to 15/14; said E is set to 255; said J is set to 19; said L is set to 1; said P is set to 112; said Q is set to 8; and said R is set to 15/14;

said outer code Λ comprises either an eight-error-correcting Reed-Solomon code on Galois field, or an eleven-error-correcting shortened BCH code based on Galois field; and

said inner code Ψ comprises either an eight-error-correcting shortened Reed-Solomon

code on Galois field, or an eleven-error-correcting shortened BCH code based on Galois field.

12. (withdrawn)

13. (original) A method for encoding an error correcting code according to claim 1, wherein:

a capacity equal to or more than a capacity of said client signal multiplied by {1-(B/D/G)} is an empty area which can be freely used;

a portion or the entirety of said empty area is regarded as the check bit area for the outer code, the check bit area for the inner code, and said overhead area, without converting the bit rates of said client signal and said super FEC signal; and

data of said client signal and said FEC signal are placed at predetermined positions to create said outer code subblock and said inner code subblock, or said outer encoded subblock and said inner encoded subblock.

14. (withdrawn)

15. (original) A method for encoding an error correcting code according to claim 3, wherein:

a capacity equal to or more than a capacity of said client signal multiplied by {1-(1/D/R)} is an empty area which can be freely used;

a portion or the entirety of said empty area is regarded as the check bit area for the outer

code, the check bit area for the inner code, and said overhead area, without converting the bit rates of said client signal and said super FEC signal; and

data of said client signal and said FEC signal are placed at predetermined positions to create said outer code subblock and said inner code subblock, or said outer encoded subblock and said inner encoded subblock,.

16. (withdrawn)

17. (original) A method for encoding an error correcting code according to claim 1, wherein:

said client signal is converted into said super FEC signal by first encoding each of said J inner code subblocks with said inner code Ψ, and encoding each of said G intermediate subblocks or said B intermediate subblocks with said outer code Λ; and

said super FEC signal is converted into said client signal by first decoding each of said G intermediate subblocks or said B intermediate subblocks with said outer code Λ, and decoding each of said J inner encoded subblocks with said inner code Ψ to exchange the order of said encoding and said decoding with said inner code Ψ and said outer code Λ.

18. (withdrawn)

19. (original) A method for encoding an error correcting code according to claim 1, wherein:

when said J inner code subblocks are encoded with said inner code Ψ, a check bit of each of said inner code subblocks is placed in a cheek bit area of an inner code subblock subsequent thereto; and

when said J inner encoded subblocks are decoded with said inner code Ψ, decoding processing is performed on the assumption that a check bit of each of said inner encoded subblocks is placed in an inner encoded subblock subsequent thereto.

20. (withdrawn)

21. (original) A method for encoding an error correcting code according to claim 1, wherein:

said client signal is any of:

an SDH signal defined in ITU-T Recommendation G.707, and SONET signal defined in ANSI Recommendation T1.105;

a signal error-correction-encoded using an eight-error-correcting Reed-Solomon code on Galois field defined in ITU-T Recommendation G.975;

a signal on an OCh layer defined in ITU-T Recommendation G.872;

any of 1000 Base-SX, 1000 Base-LX and 1000 Base-CX signals defined in IEEE standard 802.3z; and

a signal generated by time division multiplexing said above signals in an arbitrary manner.

22. (withdrawn)

23. (original) A method for encoding an error correcting code according to claim 1, wherein:

said client signal is a code encoded with the same code Φ as said outer code Λ;

said client signal is converted into said super FEC signal by:

converting a bit rate of said client signal to a predetermined bit rate, and encoding said client signal with said inner code Ψ to generate said super FEC signal; or

once decoding said client signal with said code Φ, converting a bit rate of said client signal to a predetermined bit rate, and encoding said client signal with said inner code Ψ to generate said super FEC signal; or

once decoding said client signal with said code Φ, again encoding said client signal with said outer code Λ, converting a bit rite of said client signal to a predetermined bit rate, and encoding said client signal with said inner code Ψ to generate said super FEC signal; or

converting a bit rate of said client signal to a predetermined bit rate, encoding said client signal with said outer code Λ, and encoding said client signal with said inner code Ψ to generate said super FEC signal, and

said super FEC signal is converted into said client signal by:

decoding said super FEC signal with said inner code Ψ, and converting a bit rate of said super FEC signal to a predetermined bit rate to generate said client signal; or

decoding said super FEC signal with said inner code Ψ, converting a bit rate of said super FEC signal to a predetermined bit rate, and decoding said super FEC signal with said outer code

Λ to generate said client signal; or

decoding said super FEC signal with said inner code Ψ, subsequently converting a bit rate of said super FEC signal to a predetermined bit rate, once decoding said super FEC signal with said outer code Λ, and subsequently assigning said super FEC signal once encoded with said code Φ as said client signal, or

decoding said super FEC signal with said inner code Ψ and said outer code Λ, and converting a bit rate of said super FEC signal to a predetermined bit rate to generate said client signal.

24. (withdrawn)

25. (original) A method for encoding an error correcting code according to claim 23 wherein:

said A as set to 1; said C is set to 238; and said E is set to 255,

said outer code Λ comprises an eight-error-correcting Reed-Solomon code on Galois field; and

said client signal comprises a signal error-correction-encoded using an eight-error correcting Reed-Solomon code on Galois filed defined in ITU-T Recommendation G.975.

26. (withdrawn)

27. (original) A method for encoding an error correcting code according to claim 23,

wherein:

when said client signal is converted into said super FEC signal,

inserting information indicating which of said four types of conversions has been performed at a predetermined FSI byte position into said overhead area of said super FEC signal; and

when said super FEC signal is converted into said client signal in an opposite way,

extracting information at a predetermined FSI byte position in said overhead area of said super FEC signal, and determining based on the extracted information which of said four types of conversions is performed.

28-29. (withdrawn)

30. (original) A method for encoding an error correcting code a cording to claim 1, wherein:

when said client signal is converted into said super FEC signal,

information indicating whether or not said overhead area was included in the decoding processing involved in the encoding with said outer code Λ and said inner code Ψ is inserted at a predetermined FSIB byte position in said overhead area of said super FEC signal; and

when said super FEC signal is converted into said client signal in an opposite way,

information at a predetermined FSIB byte position in said overhead area of said super FEC signal is extracted to determine based on the extracted information whether or not said overhead is included in the decoding processing involved in the decoding with said inner code Ψ

and said outer code Λ.

31. (withdrawn)

32. (original) A method for encoding an error correcting code according to claim 1, wherein:

when said client signal is converted into said super FEC signal,

inserting information indicating whether or not said client signal was encoded with said outer code Λ and said inner code Ψ at a predetermined FSIC byte position in said overhead area of said super FEC signal; and

when said super FEC signal is converted into said client signal in an opposite way,

extracting information at a predetermined FSIC byte position in said overhead area of said super FEC signal, and determining based on the extracted information whether or not said super FEC signal is decoded with said inner code Ψ, and whether or not said FEC signal is decoded with said outer code Λ.

33. (withdrawn)

34. (original) A method for encoding an error correcting code according to claim 1, wherein:

said super FEC signal is generated by:

regarding, as a single column, (G X R) bits or (B X R) bits comprised of a number of

parallel columns of R temporally synchronized consecutive bits in each of said J inner coda subblocks;

extracting a total of J columns, one from each of said J inner code subblocks, and arranging said columns successively on a time series basis;

repeatedly performing said rearrangement on all columns in said J inner code subblocks; and

newly encoding said rearranged inner code subblocks with said inner code Ψ as J inner code subblocks, or

extracting a total of J columns, one from each of said J inner encoded subblocks after encoded with said inner code Ψ, and arranging said columns successively on a time series basis;

repeatedly performing said rearrangement on all columns in said J inner code subblocks; and

assigning said rearranged inner code subblocks newly as J inner encoded subblocks.

35. (original) A method far encoding an error correcting code according to claim 1, wherein:

said super FEC signal is generated by:

grouping every S outer encoded subblocks from among said B outer encoded subblocks, and shifting groups of said S outer encoded subblocks by a constant time interval from one another to newly generate B outer encoded subblocks, or

grouping every S parallel signals from among said G or B parallel signals in said inner encoded blocks, and shifting groups of said S parallel signals by constant time interval from one

another to newly generate inner encoded blocks.

36. (original) A method for encoding an error correcting code according to claim 1, wherein:

said Kr is set to one of 16, 32 or 64;

said client signal comprises an OC-l92 signal of SONET defined in ANSI Recommendation T1.105, or an STM-64 signal of SDH defined in ITU-T Recommendation G.707; and

said outer code Λ comprises an eight-error-correcting Reed-Solomon code on Galois field.

37. (withdrawn)

38. (original) A method for encoding an error correcting code according to claim 1, wherein said client signal is a signal generated by terminating an 8B10B code of a digital signal encoded using an 8B10B code defined in IEEE standard 802.3z, and reducing a bit rate thereof in an appropriate ratio with respect to the bit rate before the 8B10B code termination, or a signal generated by terminating the 8B10B code and maintaining a bit rate thereof.

39-45. (withdrawn)